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STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF WATER RESOURCES
89 KINGS HIGHWAY, P.O. BOX 1401
DOVER, DELAWARE 19903

SURFACE WATER MANAGEMENT
SECTION

TELEPHONE: (302) 736 - 5731

November 24, 1986

Mr. Harry Daw (3HW14)
Hazardous Waste Management Division
Environmental Protection Agency, Region III
841 Chesnut Building
Philadelphia, PA 19107

Re: National Vulcanized Fiber (NVF),
Kennett Square, PA ;
Kowinsky Landfill, Kennett Square, PA ;
National Vulcanized Fiber (NVF),
State Line Landfill, Yorklyn, DE

Dear Mr. Daw:

This letter is a follow-up to our November 10, 1986 telephone conversation concerning the above-noted sites under investigation by your division. Each of these sites is situated directly adjacent to the Red Clay Creek. The Red Clay is a piedmont stream that flows from Pennsylvania into Delaware. As I had explained there is some evidence that each of these three sites had or continue to have a negative impact on the biota of the Red Clay. In addition, because the stream is used as a source of public drinking water, there may be certain human health implications.

I have enclosed a partial record of water quality, sediment, and fish tissue data for the Red Clay Creek for your review. A brief explanation of each of the submitted exhibits follows:

Exhibit #1 Partial summary of aqueous and sediment data from the Pennsylvania portion of the stream (prepared by PADER, Norristown Regional staff). Note the table comparing the Red Clay to the Schukyl and Delaware Rivers.

Exhibit #2 Fish tissue data for brown trout. Six trout were retained as controls; the remaining 494 trout were finclipped and stocked below the PA-DE border in April, 1986. Six of the finclipped trout were recaptured in August, 1986. Note that PCB's were not detected in the controls while the recaptured fish had a PCB concentration of 6.64 ppm. The FDA Action Level for PCB's is 2 ppm.

ORIGINAL
(Red)

Exhibit #3 Time plot of PCB body burden in white suckers captured annually at Ashland, Delaware in conjunction with the CORE program.

Exhibit #4 Summary results of bioassays performed by EPA, Wheeling, W. Va. personnel on the ambient waters of the Red Clay and selected "effluents". Note the highlighted test result indicating acute toxicity of the NVF Stateline Landfill leachate.

Exhibit #5 Photocpy of selected pages from the Delaware Water Quality Inventory (305(b)) Report detailing some of Delaware's efforts on the Red Clay Creek.

Exhibit #6 Photocopy of letter sent to Laura Boornazian, former EPA, Region III ERRIS coordinator, from me inquiring about the Kennett Square Landfill (a.k.a. Kowinsky Landfill?).

In addition to the information noted above, you should have on file in Philadelphia the NVF Stateline Landfill Site Investigation report performed by NUS on behalf of EPA, Region III. I feel that that report, as well as the information submitted in conjunction with this transmittal, needs to be evaluated closely by waste management and water quality personnel from Region III, EPA.

I trust that you will keep me informed regarding progress and status of CERCLA activities as they relate to the Red Clay Creek. My phone number is (302) 736-5732.

Sincerely,

Richard W. Greene

Richard W. Greene
Environmental Engineer
Water Pollution Branch

cc: Robert Koroncai (3WM12)
Robert J. Zimmerman (w/o attach.)
Augustus Mergenthaler (w/o attach.)

Attachments

Exhibit #1

RED CLAY CREEK
SUMMARY OF WATER SAMPLES
March 30,1983- October 28,1985

WATER ug/l	MAIN BR.	EAST BR.	WEST BR. HEAD.	WEST BR. UPST.	WEST BR. DOWN.	TOUGH. TRIB.	NVF TRIB.	KEN. SQ. EFF.	LC50	EPA
ΣDDT					0.128	0.08 0.345			6	0.001 1.1
DDT					0.085	0.08 0.28			6	
DDE					0.01	0.016 0.022				
DDD					0.033	0.015 0.043			9	
DIELDRIN						0.12 0.13			8	0.0019 2.5
DIAZINON					0.014	0.08 0.14			0.2-1.0	1
LINDANE		0.012	0.009 0.026	0.007	0.032	0.105 0.72		0.25	1-18	0.08 2.0
DURSBAN						0.01 0.018			6	0.06
PCB							1.3 2.4		2-10	0.014 2.0
HCHO									110	ND
ENDRIN									0.03	0.0023 0.18
ALDRIN									8	3

ORIGINAL (Red)

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RED CLAY CREEK
SUMMARY OF SEDIMENT SAMPLES
March 30,1983- October 28,1985

SEDIMENT µg/kg	MAIN BR.	EAST BR.	WEST BR. HEAD.	WEST BR. UPST.	WEST BR. DOWNS.	TOUGH. TRIB.	NVF TRIB.	KEN. SQ. SLUD.	KEN. SQ. SWALE	JUNK-YARD
Σ DDT	4	16.3(ave.) 9-19 (range)	2.7	78	16.4 3-33	1104 10-8680	3420	42	1340	ND
DDT	ND	3.5 0-7	ND	33.8	ND	921 15-8500	1900	ND	ND	ND
DDE	ND	6.5 5-8	2.7	19.75	11.5 5-18	147 6-1250	700	20	1000	ND
DDD	4	4.3 4-5	ND	24.5	8.7 3-15	182 4-880	820	22	340	ND
DIELDRIN	ND	ND	ND	32	ND	12	ND	ND	ND	ND
ENDRIN	ND	ND	ND	ND	ND	120	ND	ND	ND	ND
ALDRIN	ND	ND	ND	18	ND	ND	ND	ND	ND	ND
PCB	4	0.2	ND	ND	79 18-190	ND	40029 200-200000	286	ND	910
HCHO	3450		2500		2700 2150-3300					

RED CLAY CREEK

SEDIMENT ug/kg	RED CLAY TRIB.	SCHUYL 1978	SCHUYL. 1979	SCHUYL TRIBS 78	SCHUYL TRIB. 79	DELAWA. 1980	DELAWA. NJ TRIB.			
ΣDDT	1104 (ave.) 8680 (max.)	13 25	18 60	9.6 118	16 74	160 670	1122 4450			
DDT	921 8500	6.6 14	5.5 32	5.7 62	5.1 22	16 120	38 150			
DDE	147 1250	0.4 2	8.2 24	4 43	4.7 17	82 410	78 300			
DDD	182 880	6 12	4 11	2 13	6.4 56	61.5 510	1006 4000			
PCB	40029 200000	442 2400	152 320	99 780	42 120	112 410	170 830			
DDD/DDT	0.2	0.9	0.8	0.3	1.3	3.8	27			

ARI00132

ORIGINAL
(Red)

Exhibit #2

ORIGINAL (Red)

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

ORGANIC ANALYTICAL REQUEST

Harry W. Tetts

OCT 14 1986

DATE SAMPLED 04-16-86 SAMPLE BY Roy Miller RESULTS TO H.O. + Rick Green

COMPLETION DATE 10-7-86 ANALYST MKW APPROVED C. H. Anthony

PROGRAM - CORE / Red Clay Creek Project

SAMPLE LOG NO.	SAMPLE SITE	finfish SAMPLE TYPE	LENGTH ~~(inches)~~ CM	WEIGHT (grams)
3422	Red Clay Creek	Brown Trout	25.0	
	Yorklyn Brd. - Rd. 252 (Above NVF) Storet 103051	" "	25.5	
		" "	26.5	
		" "	26.0	
		" "	20.0	
		" "	26.5	
	Controls			

COMMENTS

cc: Shetyer

Add Zinc and Nickel.

Head tail & entrails removed

Charge to W607 Red Clay Creek Use Attainability Study.

		Units	3422	3422
No. of Fish Analyzed		6		
~~Whole Fish~~	8 Fat	8.85		
Filleted		X		
		49/6		
~~DDT~~			ND	
Aldrin			ND	
Dieldrin			ND	
op DDE			ND	
pp DDE			ND	
op DDT			ND	
pp DDT			ND	
op DDD			ND	
pp DDD			ND	
cis - Chlordane			ND	
trans - Chlordane			ND	
cis - Nonachlor			ND	
trans - Nonachlor			ND	
Endrin			ND	
Methoxychlor			ND	
Hexachlorobenzene			ND	
Pentachlorophenol			Not tested for	
BHC Delta			.09	
Lindane			.006	
Arsenic			49/9 0.47	49/9 2nd 8.90
Cadmium			<1.81	↓ Ni <1.81
Chromium			2.90	
Copper			<1.81	
Mercury			<0.019	
Lead			<1.81	

ORIGINAL (Red)

STATE OF DELAWARE

DEPARTMENT OF NATURAL RESOURCES AND ENVIRONMENTAL CONTROL

ORIGINAL (Red)

ORGANIC ANALYTICAL REQUEST

Harry W. Otto

OCT 14 1986

DATE SAMPLED 08-11-86 SAMPLE BY Roy Miller RESULTS TO H.O. + Rick Breen

COMPLETION DATE 10-7-86 ANALYST MKW APPROVED KAK

PROGRAM - CORE / Red Clay Creek Project

SAMPLE LOG NO.	SAMPLE SITE	SAMPLE TYPE	LENGTH (~~inches~~ CM.)	WEIGHT (grams)
3423	Red Clay Creek	Finfish Brown Trout	26.0	
	Yorklyn Brd. - Rd. 252 (Above NVF) Storet 103051	" "	25.5	
		" "	25.5	
		" "	24.5	
		" "	19.5	

COMMENTS

ALL 5 trout were fin tagged. ALL stocked in April 1986.

cc: Stotzer ✓

Add Zinc and Nickle.

head, tail, & entrails removed

Charge to W607 Red Clay Creek Use Attainability Study.

AR100135

		34123	B4a10	3423
No. of Fish Analyzed	5			
~~Whole Fish~~ % Fat	4.23			
Filleted	X			
	49/9			
~~PCB~~ Aroclor 1248		to.64		
Aldrin		ND		
Dieldrin		ND		
pp DDE		ND		
pp DDD		2.00		
pp DDT		.32		
pp DDT		1.92		
op DDT		ND		
op DDD		ND		
cis - Chlordane		ND		
trans - Chlordane		ND		
cis - Nonachlor		ND		
trans - Nonachlor		ND		
Endrin		ND		
Methoxychlor		ND		
Hexachlorobenzene		.23		
Pentachlorophenol		not tested for		
alpha BHC		ND		
Lindane		ND		
Arsenic			49/9 0.24	49/9 Zinc 17.32
Cadmium			<1.78	NC <1.78
Chromium			3.39	
Copper			<1.78	
Mercury			0.049	
Lead			0.24	

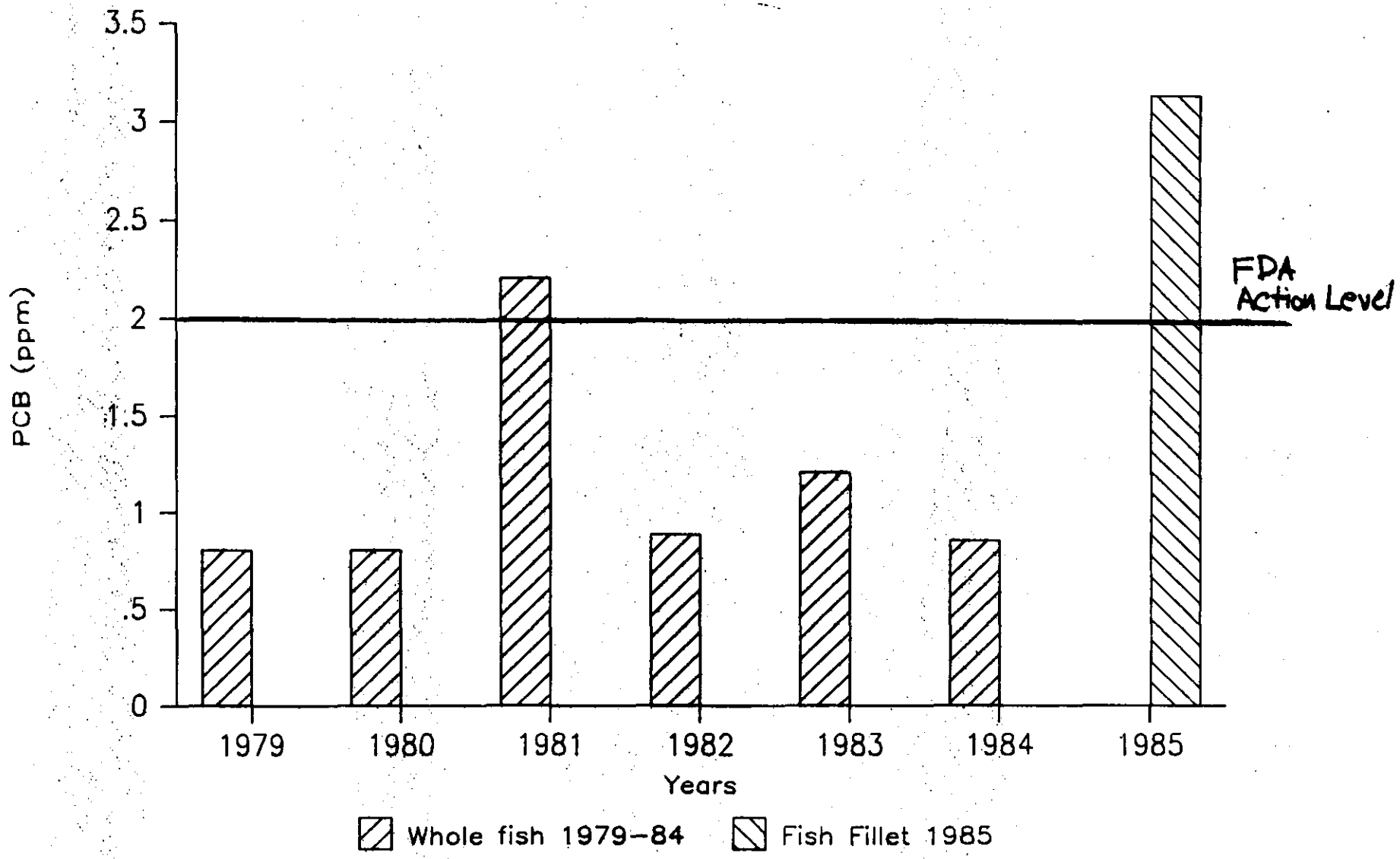
Fish Tissue

ORIGINAL (Red)

Exhibit #3

FISH TISSUE: ASHLAND

White Suckers



Exh. 6, #44

ORIGINAL
(Red)

RED CLAY CREEK TOXICITY TEST INVESTIGATION

April 28 - May 6, 1986

USEPA, Wheeling Office
Biology Section

June 5, 1986

USEPA, Wheeling Office
303 Methodist Building
11th & Chapline Streets
Wheeling, WV 26003

CONCLUSIONS

ORIGINAL (Red)

The Ceriodaphnia NOEC's (no observed effect concentration) for the Kennett Square STP, ~~State Line Leachate~~, No. 8, No. 3 and No. 2 were 10%, 10%, 25%, 50% and <25% respectively. NOEC's for the ~~State Line Leachate~~, No. 8, No. 3 and No. 2 are based on acute toxicity data and may have been considerably lower if chronic tests using multiple dilutions had been conducted.

In the fathead test no toxicity or growth inhibition was observed. The mortality observed at Station No. 4 was caused by a defective test tank, not by sample toxicity. All mean dry weights are essentially the same.

Problems were encountered in the Algal Growth Test so conversion of absorbance to cell densities or dry weight is impossible. However, the mean absorbance values measured in the 100% Kennet Square STP and Station No. 8 indicate that these samples limit the growth of the Selenastrum.

METHODS

The methods used for the fathead minnow, Ceriodaphnia dubia and Selenastrum tests generally conformed with "Short-term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms".

Grab samples were collected at eight stream locations and a 24 hour composite from the Kennett Square STP. Samples were collected daily from 4/28/86-5/4/86. The seven day tests were conducted 4/29/86-5/6/86. All samples were 24-30 hours old when tested.

The algal growth test samples were collected on 4/29/86 and tested 4/30/86-5/4/86.

The samples for the Ceriodaphnia acute tests at Stations #2, #3, #7 and #8 were collected on 4/29/86, the State Line Tributary on 5/2/86 and the NVF-State Line Landfill ~~leach~~ate on 5/3/86. All were tested the day following collection.

The tests were conducted in the Delaware State Lab and samples were collected by Pennsylvania and Delaware state employees.

RESULTS

Summaries of the Ceriodaphnia and fathead minnow data can be found in Table 2 and the Selenastrum data in Table 5.

Stations #2, #3, #7, #8, Kennett Square STP and State Line Landfill Leachate were acutely toxic to Ceriodaphnia. No reproduction inhibition was observed. NOEC's ranged from 10% to 100%.

Fathead survival ranged from 45% to 100% and the mean dry weight from 0.16-0.24 mg.

The mean absorbance measured in the Algal Growth Test ranged from 0.31 to 1.96.

Exhibit #5

RED CLAY CREEK BASIN
U.S.G.S. H.U. 02040205

ORIGINAL
(Red)

Background

The Red Clay Creek basin (number 30 on the Basin Map on page 88) drains an area of approximately 50 square miles in southeastern Pennsylvania and northern Delaware. The main stem of the creek is fed by two branches (East and West), both of which flow in a general southeasterly direction. The East Branch passes directly through the Borough of Kennett Square and the West Branch passes just to the west of Kennett Square. The two branches join at a location roughly 3/4 of a mile above the Pennsylvania-Delaware state line. The main stem enters Delaware just north of Yorklyn and flows south to its confluence with the White Clay Creek at Stanton.

Land uses in the upper areas of the basin include a mixture of agriculture, rural development, intensive mushroom production operations, and urban use. Land uses in the lower portion of the basin include a mixture of agriculture, residential development and commercial development. Topography ranges from moderate to steep throughout the basin.

Monitoring

Currently, DNREC maintains five routine water quality monitoring stations in the Red Clay Creek basin. These stations are shown on the map on the following page. A total of 11 miles are assessed. Biological surveys of the bottom-dwelling invertebrate communities were performed at two stations (103041 and 103051) in 1984 and 1985. Station 103051 is above the National Vulcanized Fiber Corporation facility and station 103041 is below the Ashland Nature Center.

In 1984, the macroinvertebrate community structure indices, dominant flora observed and species composition indicated multiple stress (toxicity and enrichment) at both stations. At station 103041, mild to moderate toxicity was the predominant stress. This effect was suggested by reduced species richness, low standing crop and high percentages of facultative and tolerant organisms. At station 103051, moderate to heavy enrichment was the predominant impact as indicated by low species richness and excessive standing crop. Species diversity and equitability values were also depressed, giving an overall picture of an unhealthy lotic environment.

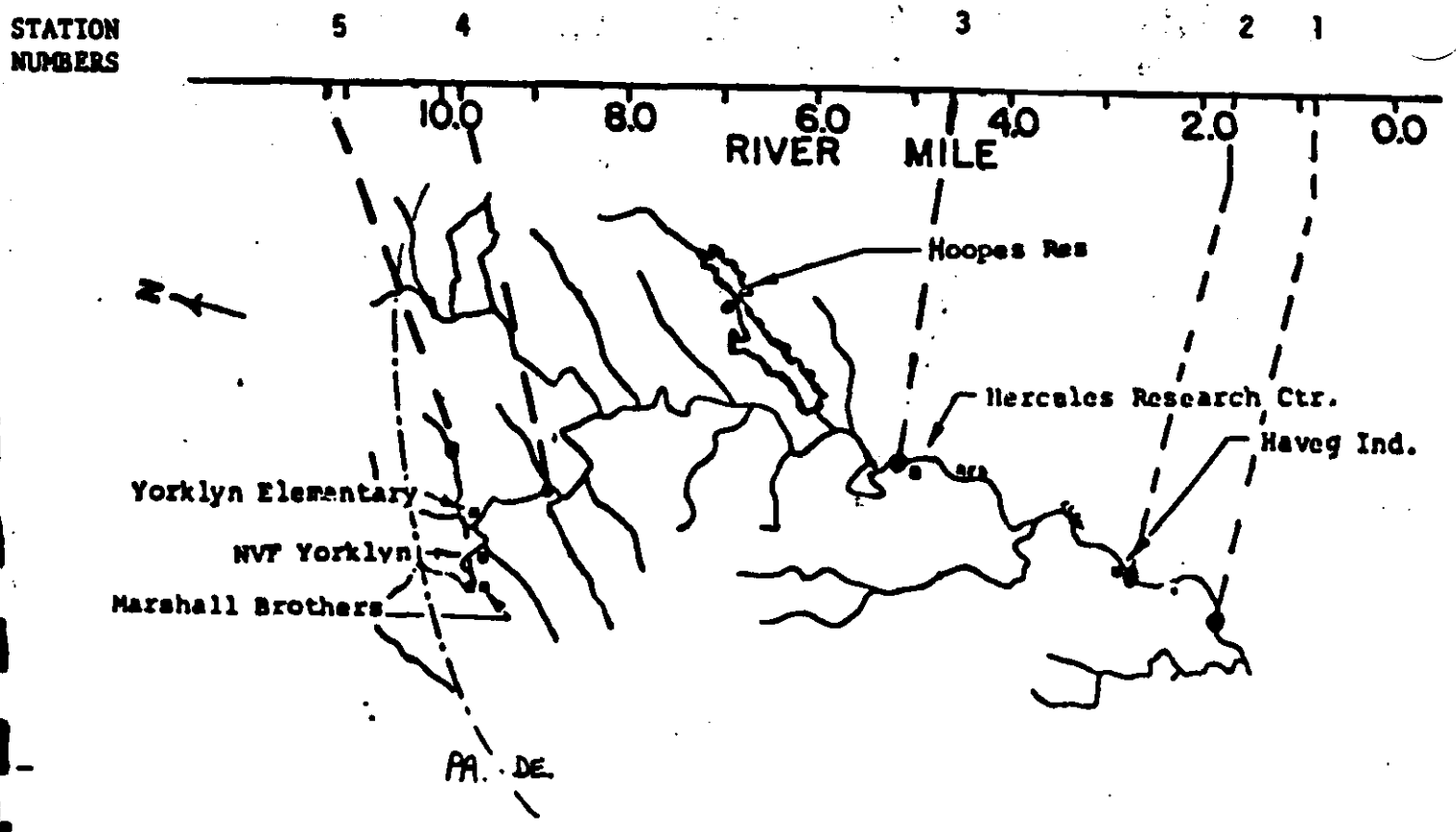
The 1985 biological survey results also indicated multiple stresses (toxicity and enrichment) at both stations. At station 103041, the standing crop was well above what it had been in 1984, while species richness, diversity and equitability had declined over the same period in question. These trends indicate an overall diminution of biological health. One possible explanation for this downward trend is that the unusual spring drought experienced during the 1985 sampling effort magnified the

RED CLAY CREEK BASIN MAP AND SAMPLING STATIONS

ORIGINAL
(Red)

Red Clay Creek (70.78/10.00/2.60 - Delaware/Christina/White Clay)

	LOCATION DESCRIPTION	RIVER MILES	STATION/STORET NUMBERS
1.	Stanton Bridge - Del. Rt. 4	0.75	1-103011
2.	Marshallton - Rd. 332	2.04	2-103021
3.	Wooddale - Del. Rt. 48	4.71	3-103031
4.	Ashland - Rd. 258A	9.79	4-103041
5.	Rd. 252 Bridge - Yorklyn	11.14	5-103051



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stresses already known to exist at that station. At station 103051, the benthic community appeared to be improved over the previous year. The 1985 results did not indicate spectacular recovery nor improving water quality however as species richness and diversity had merely gone from poor to fair. Virtually all organisms identified were either of the facultative or tolerant categories, thus suggestive of toxic stress.

In addition to the annual biosurveys, DNREC also collects and analyzes fish and sediments from the creek once per year to test for the presence of toxic metals and synthetic organic chemicals. Results of the 1984 efforts were available for this review, but the 1985 results were not. Although a number of toxic compounds were indeed present in the 1984 samples (e.g. PCB, DDT, pesticides, and zinc), in no case were the levels (in the case of fish flesh) considered to pose a significant risk to humans who may consume the tainted fish. Similiar testing performed on the Pennsylvania portion of the creek by Pennsylvania's Department of Environmental Regulation (PADER) has revealed that contaminant levels there are significantly higher than in Delaware. PADER has informed DNREC that, as a result of their intensive sampling efforts, they are narrowing in on the toxicity source(s).

The contention that contaminant levels are more severe in the Pennsylvania portion of the creek were further borne out by chronic bioassay screening tests conducted by the Environmental Research Laboratory of the EPA in April of 1985. The "state of the art" EPA tests, intended to detect the more subtle effects of ambient toxicity, were run on several aqueous creek samples using the macroinvertebrate Ceriodaphnia affinis/dubia. The results of their tests indicated that a conservative pollutant source lies above Kennett Square, Pennsylvania on the West Branch of the creek and that the creek demonstrates no significant recovery until it reaches Stanton, Delaware. Because these tests were merely of a screening nature, DNREC and PADER water quality personnel have worked together to arrange for EPA to conduct "definitive" bioassays in the spring and late summer of 1986. The results of these efforts will be incorporated into a comprehensive study of the Red Clay presently underway.

Standards and Designated Uses

Red Clay Creek water quality is governed by the general freshwater criteria (Section 10A, Appendix 2), the special criteria for public water supplies (Section 10 B.1 of Appendix 2), and the special criteria for put-and-take cold water fisheries (Section 10 B.2 of Appendix 2). The designated protected uses for the creek include public water supply, industrial and agricultural water supply, primary and secondary contact recreation, propagation of fish, aquatic life and wildlife, as well as maintenance of a put-and-take cold water fisnery from the PA-DE line to the concrete bridge above Yorklyn on a year-round basis. The creek curently rates 1st (out of 36 basins) on DNREC's basin priority list.

Historical Water Quality

The 1984 Delaware Water Quality Inventory indicated that 100% of the monitored miles did not meet the "fishable-swimmable" use as defined in the Clean Water Act. The fish and aquatic life use was threatened by toxics found in the stream, while the secondary contact recreation use was only partially supported due to high bacteria and toxics levels. Specific problems noted include elevated fecal coliform and dissolved solids concentrations as well as elevated zinc concentrations downstream of Yorklyn. The sources of the problems were estimated as follows (in descending order of importance): industrial, non-point source runoff in Pennsylvania, and municipal discharges in Pennsylvania.

Recent Water Quality: July, 1983 to June, 1985

Analyses of water quality data has been accomplished using the EPA-STORET computer system programs STAND and MEAN (for further details, refer to the Introduction). Examination of the STAND "violations programs" results shows evidence of water quality impacts. The STAND evaluation, which is based on an average of approximately twenty-three samples at each station, shows continuing problems with major fecal coliform levels throughout the basin. This finding suggests that the primary contact recreation use may not be fully supported.

A review of the MEAN program results shows evidence of additional water quality problems. Elevated zinc concentrations are found in the creek downstream of the NVF-Yorklyn facility, with mean values ranging from 0.24 mg/l to 0.57 mg/l. On one occasion, a concentration of 1.1 mg/l was detected. Toxicity to certain aquatic organisms may be expected at these levels. Nutrient concentrations are moderate to high throughout the basin, with the worst problems evident closest to the PA-DE state line. Mean total nitrogen levels range from 3.9 mg/l to 5.3 mg/l, while mean total phosphorus concentrations range from 0.25 mg/l to 0.5 mg/l. Log mean fecal coliform counts range from 1096 to 564 in the basin, thus indicating some risk to primary contact recreation use.

Discussion

The above discussion suggests that some designated uses are not fully supported. Primary contact recreation may be affected by elevated fecal coliform values. Fish and aquatic life propagation is affected by zinc and other toxic compounds in the creek. This contention is supported by the findings of the biological surveys discussed previously. Potential risks also exist to the public water supply use as a result of the toxicity problems noted. Best professional judgement leads us to believe that the federal Clean Water Act "Fishable-swimmable" use is best characterized as "unattained" for fishable, and "generally at-

tained" for swimmable (although both bacteria and toxics findings suggest some risk to swimmers may exist).

Comparison of 1984 and current water quality in the Red Clay reveals little change. Zinc and total phosphorus have remained at nearly identical levels, while total nitrogen and fecal coliform have trended slightly upward. Comparison of histological data also reveals little change. Levels of toxic substances in fish collected (primarily white suckers) remain elevated but essentially unchanged over this period of record. Review of the 1985 tissue data is expected to shed more light on this issue.

The causes of use non-support are estimated as follows (in descending order of importance): industrial, non-point source runoff in Pennsylvania, and municipal discharges in Pennsylvania.

There are three permitted Delaware point source dischargers in the Red Clay Creek basin. These are: NVF Company, Yorklyn; Hercules, Incorporated; and Haveg, Incorporated. The total wastewater flow from these facilities is approximately 3.35 MGD, the total mass loadings being about 885 lbs/day of TSS and 545 lbs/day of BOD_5.

Looking Ahead

Red Clay Creek has been designated as DNREC's top priority basin. As such, we have formulated and initiated a multi-year "use attainability" study for this basin. The primary objective of this project is to develop a basinwide management plan which outlines the actions necessary to obtain the current designated uses. Although no "camera ready" report has been prepared to date, progress has been significant. Most notable in the success column has been the cooperation of Pennsylvania's Department of Environmental Resources in addressing the sundry upstream problems which adversely impact Delaware's water quality. Another positive note regarding activities associated with the project has been the successful negotiation with NVF, Yorklyn management in undertaking a comprehensive toxics reduction study. The question remains as how best to relieve the stress posed by the zinc bound to the sediments below the NVF facility.

Another notable activity pertinent to the Red Clay is the inclusion of the basin in the "Stream Watch" program. The objective of this program is to encourage citizen involvement in the protection of stream water quality. The project is expected to begin in the spring of 1986.

Exhibit #6

ORIGINAL
(Red)

STATE OF DELAWARE
DEPARTMENT OF NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
Division of Water Resources
Water Management Section
89 KINGS HIGHWAY
P.O. BOX 1401
DOVER, DELAWARE 19903

TELEPHONE: (302) 736 - 4761

September 19, 1985

Ms. Laura Boornazian
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107

Dear Laura:

As a follow-up to our conversation of September 19, 1985, I have enclosed information concerning the Kennett Square Junk Yard/Dump. It is unclear at the present time whether this site has or ever had CERCLA status.

As I had explained, DNREC has an interest in this site because we are actively attempting to pinpoint source(s) of toxicity to the Red Clay Creek. As such, any information you can pass on concerning this or any other site(s) (i.e. NVF State Line Landfill Site Investigation results) would be greatly appreciated.

I look forward to hearing from you regarding these matters. If you need to contact me, I may be reached at (302) 736-5732.

Sincerely,

Richard W. Greene
Environmental Engineer
Water Pollution Branch

AR100147